General comments:

This manuscript conducted a series of LES experiments to examine the dry-wet season contrast on the evolution of deep convection processes, particularly, the interaction between updraft velocity and microphysics on convective vigor. Through tracking thermals in simulated golden cases, it found that dry-case (wet-case) convection tends to generate more (less) numbers of droplet-loaded thermals in the lower atmosphere, corresponding to larger potential buoyant energy at a low level in the dry season. Greater concentration of low-level thermals can potentially lead to more cold precipitation production and convection invigoration. In general, this manuscript is well designed, which uses both LES simulation and observations to investigate underlying processes. It is also quite novel to track microphysical properties within cloud thermals rather than updraft plumes, which provides a new perspective to understand updraft-microphysics interaction. Overall, I think this manuscript presents great work that is worthy of publication. I just have some minor comments as follows:

Minor comments:

1. L165: "without expectations for larger hail in Amazon deep convective storms", is there any reference or literature to support this statement?

We added the following citations for this statement.

Liu, C., & Zipser, E. J. (2015). The global distribution of largest, deepest, and most intense precipitation systems. *Geophysical Research Letters*, *42*(9), 3591-3595. https://doi.org/10.1002/2015GL063776

Bang, S. D., and D. J. Cecil, 2019: Constructing a Multifrequency Passive Microwave Hail Retrieval and Climatology in the GPM Domain. J. Appl. Meteor. Climatol., 58, 1889–1904, https://doi.org/10.1175/JAMC-D-19-0042.1.

2. L221: What about the initial condition and surface fluxes? How to initialize each run? I don't see any description of these conditions.

A large-scale forcing (LSF) analysis is used to initialize the GCE atmospheric profile and also to drive GCE through forcing nudging (e.g., Matsui et al. 2023).

We added the following sentences.

"Each daily LES is initialized at 12 AM local time **from the LSF** and"

“The horizontal/vertical advective forcings, mean wind profiles, and surface heat fluxes from the GoAmazon LSF are used to drive the LES. These fields are interpolated and imposed as tendency terms at every model time step.”

3. L429: There also seems to be discrepancy in GH and RN categories as well. Did you compare the simple statistics such as precipitation and cloud fraction between observation and simulation for more direct comparisons? This comparison can directly reveal how well the simulated case represents typical cloud and precipitation environment of each season.

We previously mentioned the GH discrepancy in the preceding paragraph. The slight biases in the RN category should be connected to the GH biases. We did not want to emphasize these biases too much in this paper. Instead, we chose to focus on the performance in the dry-wet difference.

Our previous paper (Tao et al. 2022) has already validated precipitation, and the results showed that GCE follows the observed (forcing precipitation) quite well when forced by the LSF. However, we did not conduct any cloud fraction validation since GCE uses a doubly cyclic boundary condition with narrow domains where advected upper-level clouds often dominate the cloud fraction.

We have added the following citation and sentence in Section 2.2:

“Our previous research demonstrated that GCE reproduced the observed precipitation quite well when forced by the GoAmazon LSF (Tao et al. 2022).”

Tao, K., Iguchi, T., Lang, S., Li, X., Mohr, K., Matsui, T., & Braun, S. (2022). Relating Vertical Velocity and Cloud/Precipitation Properties: A Numerical Cloud Ensemble Modeling Study of Tropical Convection. *Journal of Advances in Modeling Earth Systems*, *14*(9), e2021MS002677. https://doi.org/10.1029/2021MS002677

4. L482: What is the definition for “golden events”? I don’t seem to find this in the manuscript.

For clarification, we have modified the following sentence from
*“*Namely, we select two single-day simulation cases representing typical dry and wet-season convection.*”*
to
“Golden cases are two single-day simulation cases, one for dry and one for wet season, representing V_{dop} CFADs of each season.”

5. L601: Could you elaborate on this statement? If the thermal size is smaller, shouldn't we expect more rather than less dilution from the environment?

Our results did not support our typical assumption that smaller thermals tend to have more dilution. Our previous research, conducted by Hernandez-Deckers and Sherwood in 2018, also indicates that the variability of thermal radius can only account for 20% of the total variance of thermal dilution rate. This was concluded through similar thermal tracking analysis from different LESs. Therefore, thermal size cannot be considered the sole predominant parameter for determining dilution rate.

We added the following new sentence.

"Interestingly, slightly smaller thermal radii in dry-case convection can have a lower entrainment rate than in wet-case convection. Hernandez-Deckers and Sherwood (2018) also found that the variability of thermal radius can only account for 20% of the total variance of thermal dilution rate, i.e., larger thermal tends to have a lesser dilution rate. This was concluded through similar thermal tracking analysis from different LESs. Therefore, thermal size is not the sole parameter for determining dilution rate."

6. L607: Again how so?

It is a good question. It's speculated that the dry season convection needs more energy to break a stable atmosphere when the shallow-to-deep transition occurs in convection. This process will likely concentrate updraft energy in a narrow area because most of the atmosphere remains stable in the dry season. This will be subject to future investigation.

We added the following sentence.
"This is merely speculative and requires further investigation to confirm or refute."

7. L619: lesser -- fewer

Corrected.

8. L622: normalizing – normalization

Corrected.